

MIDTERM REVIEW---HONORS

NAME: _____

REAL NUMBERS --- Section 1.1

- 1) Given the set: $\left\{-3, \sqrt{12}, \frac{16}{4}, -\sqrt{64}, 7.121121112..., 7\frac{2}{5}, -9.55, 0, 8, \frac{13}{72}, 4.\overline{1237}, .72\overline{3}\right\}$

List ALL the elements of the set that belong to each set below.

- a) Natural Numbers (N) _____
- b) Whole Numbers (W) _____
- c) Integers (I) _____
- d) Rational Numbers (Q) _____
- e) Irrational Numbers (Ir) _____
- f) Real Numbers (R) _____

- 2) Match each equation to the name of the property illustrated by the equation.

- | | |
|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| _____ a) $9 + (\sqrt{5} + 0) = 9 + (0 + \sqrt{5})$ | 1) Associative Property of Multiplication |
| _____ b) $2 + 7\left(\frac{2}{3} \cdot \frac{3}{2}\right) = 2 + \left(7 \cdot \frac{2}{3}\right) \cdot \frac{3}{2}$ | 2) Commutative Property of Addition |
| _____ c) $2 + 7 \cdot 1 = 2 + 7$ | 3) Inverse Property of Multiplication |
| _____ d) $6(-4 + 4) = 6(0)$ | 4) Inverse Property of Addition |
| _____ e) $6(-4 + 4) = -24 + 24$ | 5) Identity Property of Multiplication |
| _____ f) $9 + (\sqrt{5} + 0) = 9 + \sqrt{5}$ | 6) Identity Property of Addition |
| _____ g) $2 + 7\left(\frac{2}{3} \cdot \frac{3}{2}\right) = 2 + 7 \cdot 1$ | 7) Distributive Property |

- 3) Complete the following using the order of operations. Do only **ONE STEP** at a time.

$$8 + (-3^2 + 3) \div 2 \cdot 4 - 6$$

ORDER AND ABSOLUTE VALUE --- Section 1.2

- 4) Evaluate the following expression given $x = -3$ and $y = -5$.

$$\frac{2|y| - x^3}{|y^2 + 3x|}$$

5) Given $x > 3$, write each of the following without absolute value bars.

a. $|x^2 - 9| =$ _____

b. $|9 - x^2| =$ _____

c. $|3 - x| =$ _____

d. $|-x^2 - 2| =$ _____

RATIONAL EXPONENTS --- Sections 1.3/1.6

6) Evaluate each of the following. Show the problem you use to complete each.

a. $(-5)^2 =$ _____

b. $-5^2 =$ _____

7) Simplify (no like bases, no negative exponents) each of the following.

a. $\frac{(2k)^{-3}(k^{-5})^{-1}}{(6k^{-2})^{-1}(k^3)^{-6}}$

b) $\frac{3x^3y^{-\frac{1}{5}}z^{\frac{2}{9}}}{4x^{-2}z^{\frac{1}{3}}}$

8) Simplify $243^{\frac{2}{5}}$.

RADICAL EXPRESSIONS --- Section 1.7

9) Simplify: $\sqrt[4]{x^{12}y^{46}z^{103}}$

10) Add /Subtract: $-3\sqrt{54} - 2\sqrt{18} + 5\sqrt{96}$

11) Rationalize the denominator:

a) $\sqrt[3]{\frac{5}{24}}$

b) $\frac{2+2\sqrt{6}}{4-\sqrt{6}}$

COMPLEX NUMBERS --- Section 2.3

12) Multiply: $3\sqrt{-27} \cdot 2\sqrt{-60}$

13) Simplify: i^{2306}

14) Add/Subtract: $(7 - 3i) + (-4 + 7i) - (6 - 8i)$

15) Rationalize: $\frac{4+3i}{2-5i}$

POLYNOMIALS --- Section 1.3

16) Give the degree and the most specific classification for: $3x^3 + 5x^2y^4 - 8xyz$

17) Add/Subtract: $(3x^2 - 2x + 3) + 4(5x^2 - 2x + 4) - (2x^2 + 6x - 7)$

18) Multiply: $(3x + 5)(2x^2 - 3x + 5)$

19) Divide: $(4x^4 - 4x^3 - 1) \div (2x^2 - 1)$

20) Square the trinomial: $(3x^3 - 7z^8 + 2)^2$

THE BINOMIAL THEOREM --- Sections 1.3 and 8.4

21) Use **Pascal's triangle** to expand $(4x + 3)^5$.

COUNTING THEORY --- Section 8.6

22) Write the factorial notation and evaluate the following:
a) $P(10,7)$ b) $C(10,7)$

23) A teacher has 5 books
a) How many ways can she arrange 3 of these on her desk?

b) How many ways can she pick 3 of these give to another teacher?

24) A math class consisting of 18 males and 12 females is preparing for the midterm exam.
a) How many study groups of 5 can be formed?

b) How many study groups of 2 males and 3 females can be formed?

FACTORING POLYNOMIALS --- Section 1.4

25) Factor each of the following polynomials COMPLETELY:

a) $27x^{27} - 64y^{15}$ _____

b) $20x^2 - 28x - 3$ _____

c) $25x^2 - 60x + 36 - 81y^2$ _____

d) $9x^2(2x^4 + 7)^3(x + 3)^7 - 2(2x^4 + 7)^4(5)(x + 3)^6$ _____

RATIONAL EXPRESSIONS --- Section 1.5

26) Reduce: $\frac{81 - 16x^2}{4x^2 - x - 18}$

27) Divide: $\frac{x^2 + 4x + 4}{3x + 12} \div \frac{x + 2}{x^2 + 4x}$

28) Subtract: $\frac{x - 7}{x^2 + 4x - 5} - \frac{x - 9}{x^2 + 3x - 10}$

29) Simplify: $\frac{\frac{1}{x-1} - \frac{6}{x}}{\frac{1}{x}}$

EQUATIONS/APPLICATIONS --- Sections 2.1, 2.2, 2.4, 2.5, 2.6

30) Solve the equation: $\frac{y+3}{y-6} + \frac{y-2}{y+2} = \frac{2y^2+9}{y^2-4y-12}$

31) Solve the equation $\frac{2b}{c-1} = b-d$; for c

32) Solve the equation: $5(x^2 - 1) = 2x(x + 6)$
a) Using the quadratic formula

b) By completing the square

33) Calculate the discriminant and tell what kind and how many solutions each of the following quadratic equations has.

a) $4x^2 - 4x = 3$

b) $4x^2 - 12x = -9$

c) $4x^2 - 4x = 10$

d) $4x^2 - 12x = -10$

34) Solve the equation: $\sqrt{3x+4} - 1 = \sqrt{x+5}$

35) Solve the equation: $2x^{-4} - 5x^{-2} = 3$

36) If Andrew can paint the house in 8 hours and Pat can paint the house in 6 hours, how long will it take them to paint the house if they work together?

37) The width of the rectangle is 9 inches longer than twice the length. If the area of the rectangle is 18 square inches, what are the dimensions of the rectangle?

- 38) Two friends decide to meet in Chicago to attend a Cub's baseball game. Rob travels 310 miles in the same time that Carl travels 295 miles. Rob's trip uses more interstate highways and he can average 3 mph more than Carl. What is Rob's average speed?
- 39) A landscape architect has included a rectangular flower bed measuring 9 feet by 5 feet in her plans for a new building. She wants to use two colors of flowers in the bed, one in the center and the other for a border of the same width on all four sides. If she has enough plants to cover 24 square feet for the border, how wide can the border be?
- 40) Including an 8% sales tax, an inn charges \$162 per night. Find the inn's nightly cost before the tax is added.

